

Ontario Child Health Study: Children at Risk



Children at Risk

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This booklet presents findings from the Ontario Child Health Study conducted by the Child Epidemiology Unit of the Department of Psychiatry of McMaster University and the Child and Family Centre of Chedoke-McMaster Hospitals in cooperation with the Special Surveys Division of Statistics Canada. The Child Epidemiology Unit received support from provincial lottery funds allocated to the Ontario Ministry of Community and Social Services to conduct the Child Health Survey. Additional funds for purposes of analysis were provided by the Ministry. Financial support for substudies was also provided by the National Health Research and Development Program.

This is the second publication that presents selected findings from the Ontario Child Health Study. Copies of this booklet, as well as Ontario Child Health Study: Summary of Initial Findings (1986) and a list of other related papers, are available from the Ministry or the Child Epidemiology Unit. Published papers from the study are listed in Appendix One. Readers wishing more information on the methodology or the results of the study should write to:

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Summary

The Ontario Child Health Study (OCHS) was a province-wide survey of the mental and physical health of a randomly selected sample of more than 3,000 Ontario children aged 4 to 16. The survey was carried out in 1983 as the first part of a longitudinal study.

The design of the survey, the questionnaires used, the methods for measuring psychiatric disorders and the initial findings are described in the first booklet in this series, *Ontario Child Health Study: Summary of Initial Findings*.

This summary highlights major findings from the second booklet, *Children at Risk*, based on the OCHS. The booklet explains the data analyses used and presents detailed results and their implications. It also includes a glossary of definitions of the various technical terms. The published papers from the OCHS as of May 31, 1989 are listed in Appendix One.

Who Will Be Interested in This Booklet?

It will be of interest to workers in a variety of settings, such as health, social services, education, recreation and housing, whose aim is to improve children's quality of life.

Contents

The booklet reports on groups of children at risk for three outcomes: (1) psychiatric disorder; (2) perceived need of professional help for emotional or behavioural problems; and (3) poor school performance. It looks at how well three risk indicators can identify groups of children with increased rates of these three outcomes. The risk indicators are: (1) family on social assistance; (2) one parent in the home; and (3) family living in subsidized housing. One reason these indicators were chosen was because the data necessary for their identification are, or can be, collected routinely. Prevention and intervention programs could be launched on a community basis for children living in subsidized housing, or in the case of children living in families on social assistance, through programs tied to the services provided to their parents. "One-parent" was included because of the growing frequency of this type of family. Thus, the populations identified by these risk indicators are of major concern in the policy development, clinical practice, and prevention program areas.

The results are presented in four parts:

- (1) the frequency and overlap of the risk indicators and of the outcomes
- (2) the strength of the association between the risk indicators and the outcomes, and the extent to which they vary as a function of the child's sex, age, and urban or rural area of residence
- (3) the extent to which family dysfunction and low income explain, or account for the relationship between a risk indicator and an outcome; and
- (4) the issues of attributable risk, that is, the maximum extent to which an outcome can be attributed to an individual risk indicator, and the prevented fraction, the maximum extent to which an outcome would be prevented by exposure to an individual protective factor.

What is the Value of This Information?

Being able to identify **groups** of children who are at risk for different forms of childhood problems, or perceived to be in need of services, is important for several reasons:

- scarce diagnostic and treatment services can be allocated to them in proportion to their problems or perceived need;
- research can focus on determining why a particular group of children is at increased risk; and
- knowledge about the mechanisms or causes placing the children at risk will make it possible to set up rational prevention programs aimed at reducing the incidence of disorders or other problems in that group of children.

Results and Their Implications

(1) How often do the risk indicators and outcomes occur? Are there children who are exposed to more than one risk indicator or who exhibit more than one outcome?

Among the risk indicators, one parent is the most common (10.7%), followed by social assistance (6.3%) and subsidized housing (4.2%). They are all more prevalent in urban than in rural areas. Welfare is 1.7 times as frequent, single parent over twice as frequent, and virtually all subsidized housing is in urban settings.

The risk indicators are strongly associated with each other. For instance, the rate of social assistance in one-parent families is 41.1%; the rate of social assistance in two-parent families is 2.2%. Similarly, 50.0% of children in subsidized housing are living in families on social assistance. Obviously, children who are environmentally disadvantaged in one sociodemographic area are at great risk of being disadvantaged in another.

The frequency of the outcomes varies significantly by age and sex. The highest rates of psychiatric disorder are in adolescents but they have the lowest rate of perceived need of professional help for emotional and behavioural problems. This striking mismatch in teenagers between rate of disorder and perceived need of help deserves further examination.

It should be emphasized that different definitions of psychiatric disorder will result in different prevalence rates. For instance, if a definition of disorder required exceeding the thresholds on checklists from two respondents (e.g., parent and teacher, or parent and youth), rather than just one (e.g., parent or teacher, or parent or youth), the prevalence of psychiatric disorder would be reduced for children 6 to 16 from 15.0% to 3.0%. In addition, different requirements about persistence of disorder would also alter prevalence rates. Further work is needed to learn which of several definitions of disorder is the most appropriate for different purposes such as planning clinical services or formulating primary prevention projects.

As with the risk indicators, the outcomes are also strongly related to each other. For instance, 23.7% of the children with psychiatric disorder also perform poorly at school; the rate of poor school performance among those without psychiatric disorder is 13.0%. These, and other findings, suggest that clinical services must be designed to care for children with more than one problem. Provincial ministries concerned with children must work together to launch coordinated diagnostic and intervention programs, as the problems children have do not follow Ministry boundaries.

(2) How are the risk indicators and outcomes related, and how does their distribution vary in different segments of the population?

The strength of the risk indicators varies for different outcomes and for different groups of children. Social assistance is a stronger risk indicator for poor school performance in girls than in boys. Girls whose families are on social assistance have 3.9 times the rate (31.4%/8.1%) of poor school performance compared to girls

not on social assistance; for boys the figure is 1.4 (26.3%/18.2%). It is not known why social assistance status is such a strong indicator of poor school performance in girls. Further work is urgently needed on this issue so that informed intervention efforts can be launched.

Without considering other relevant variables (e.g., income, family dysfunction), one parent is a strong indicator of psychiatric disorder in young children. One of four of these children have psychiatric disorder compared to about 1 of 9 children in two-parent families. Parenting programs, social support programs, and other interventions should be designed to help one-parent families cope with emotional and behavioural problems in their younger children, particularly in managing effectively their aggressive behaviours.

Children in subsidized housing show several severe disadvantages. For instance, psychiatric disorder affects almost one-third, and over 40% of older children in this setting perform poorly in school. Over one-third of young children in this setting are perceived as needing professional help for emotional and behavioural problems. Programs are urgently needed to raise the life quality of this sizeable group of children. Since these children usually live in clearly defined areas, community prevention programs (for example, first-rate recreation programs integrated with other types of community programs) should be launched and rigorously evaluated.

(3) How is the strength of the relationships between the three risk indicators and the outcomes altered when low income and family dysfunction are taken into account? Does the strength of these relationships vary by such variables as age, sex, and urban/rural residence?

It should be emphasized that the results obtained in these analyses are heavily dependent on the variables selected for inclusion. Thus, the strength of association between the same variable and outcome may be different depending on the variables selected for analysis.

In the case of psychiatric disorder, much of the strength of the relationship between social assistance and disorder is accounted for by low income and family dysfunction. Similarly, the association of the other two risk indicators (one parent and subsidized housing) with psychiatric disorder is explained in large part by the effects of low income and family dysfunction. Income supplement programs should be implemented and evaluated for their impact on the mental health of children.

For the outcome, perceived need of professional help, family dysfunction has a strong independent predictor effect. Subsidized housing is a significant risk indicator for this outcome for younger children only.

In the case of poor school performance, family dysfunction plays no significant predictor role. This is in contrast to its central role in predicting psychiatric disorder. Thus, these two major types of childhood problems, one in the cognitive area and the other in the affective and behavioural realm, appear to have somewhat different origins. Improving family functioning would be expected to have a beneficial effect on children's adjustment but not necessarily on their school performance.

Other data related to poor school performance indicate that children on social assistance in non-subsidized housing, and girls living in families on social assistance are at increased risk for doing poorly at school even after taking into account the effects of low income and family dysfunction. Overall, there appears to be a strong need for preventive interventions early in the lives of children whose families are on social assistance.

(4) What about protective factors?

Protective factors are variables that reduce the frequency of an outcome in the presence of risk factors. Data on selected protective factors, such as, "gets along well with others" and "good peer relationships" indicate that prevention programs should be designed to foster the development of these protective social skills. For example, if "gets along well with others" and the mechanisms by which it operates to reduce the frequency of psychiatric disorder could be effectively fostered in children, disorder might be reduced substantially. However, caution is needed in interpreting this result because the current cross-sectional data do not allow one to know with certainty that this protective factor antedates the onset of psychiatric disorder and is causally related to its prevention. Nevertheless, the results suggest that effective intervention programs aimed at improving social skills might significantly reduce psychiatric disorder and perceived need of professional help.

(5) What are the program implications of the data discussed in this booklet?

The findings from the OCHS presented in this booklet have important program implications. Ministries in Ontario concerned with children must overcome their jurisdictional and funding boundaries and cooperate in preventive and intervention efforts. Quality child-care programs should be expanded as a preventive measure against poor school performance and emotional and behavioural problems for poor children regardless of whether or not their parents are working. Income supplement programs should be implemented and evaluated to determine if improving the financial status of families benefits the social, emotional and behavioural adjustment of children. Programs, such as first-rate recreation or skill-development programs should be developed for children in subsidized housing to raise their quality of life. Parenting, social support, and child care programs should be targeted to single parents with young children. The implications of high rates of disorder among adolescent girls in combination with low rates of perceived need of professional help should be evaluated. Lastly, programs fostering child-protective social skills should be developed and evaluated.

What are Some Future Directions?

The data in this booklet suggest lines of future inquiry. The entire sample of the OCHS, identified in 1983 was followed up in 1987 when the children and youth were between the ages of 8 and 20. This longitudinal perspective will permit the identification of variables that antedate an outcome and are likely to be risk factors for it. In addition, information will be available to help distinguish between persistent and non-persistent psychiatric disorder, at least over a 4-year span. Data from the follow-up study should advance knowledge about which variables prevention programs might focus on and to which populations these programs should be directed.

Other future lines of inquiry are suggested by the findings reported in this booklet. For instance, work is needed on discovering the mechanisms that explain why social assistance is such a strong risk indicator for poor school performance in girls. Such information would provide a sound basis for intervention programs which should be rigorously evaluated. The findings outlined in the booklet should raise more precise questions which will have to be addressed through a series of focused studies. The major goal will be to discover rational, effective, reasonably-priced prevention and intervention programs which raise the life quality of groups of children at risk and their families, and perhaps improve their life chances.

Introduction

Being able to identify groups of children who are at risk for different forms of childhood problems, or perceived as being in need of services, is important for several reasons. Scarce diagnostic and treatment services can be allocated to them in proportion to their problems or perceived need. Research efforts can focus on determining why a particular group of children is at increased risk. It should be noted that such information can only identify groups of children at risk and cannot specify particular children in the group with an increased risk status. However, knowledge about the mechanisms or causes placing the children at risk would make it possible to set up rational prevention programs aimed at reducing the incidence of disorders or conditions in that group of children. This booklet should be of interest to those working in a variety of settings, such as health, social services, education, recreation and housing, to improve children's quality of life.

Characteristics that identify groups of children with higher rates of an outcome can be called risk indicators. These can be characteristics of the child, such as chronic medical illness, or they can be characteristics of the child's parents or neighbourhood, or other aspects of the environment. It should be emphasized that a risk indicator simply identifies a population of children with an increased frequency of an outcome. It may or may not be causally involved in producing this increased rate.

This booklet reports findings concerning groups of children at risk for three outcomes: psychiatric disorder, perceived need of professional help for emotional and behavioural problems, and poor school performance. Three risk indicators external to the child are considered: family on social assistance, one parent in the home, and family living in subsidized housing. The definitions of these and other terms used in this publication are listed alphabetically in the glossary.

The major purpose of the booklet is to examine the strength of each of the risk indicators in selecting groups of children with an increased rate of the three outcomes. The extent to which this strength varies by sex and age groups, and urban/rural residence will also be presented. A secondary goal is to investigate the extent to which the presence of family dysfunction or low income can explain the relationship between a risk indicator and an outcome.

The risk indicators and outcomes used in this report were selected from a broader range of variables measured in the Ontario Child Health Study (OCHS) on the basis of their importance and usefulness in addressing clinical and policy issues. Clinicians and policy makers can usually identify groups of children with the risk indicators "social assistance", "one parent" and "subsidized housing". The data necessary for these identifications are, or can be, collected routinely. Further, prevention and intervention programs could be launched on a community basis for children living in subsidized housing, or in the case of children living in families on social assistance, through programs tied to the services provided to their parents. "One parent" was included as a risk indicator because of the growing frequency of this type of family constellation in our population. "Family dysfunction" and "low income" were chosen as control variables to be examined for their possible role in explaining the relationship between a risk indicator and an outcome because it is known, in many instances, that they are strongly related to both. "Psychiatric disorder" was selected as the major outcome in the adjustment or mental health of the child. "Perceived need of professional help" (for emotional or behavioral problems) was chosen because it takes into account the perception of the parent, teacher or youth, and is tied more closely to the use of services than the other two measures of poor outcome. "Poor school performance" was decided upon as the major outcome in the cognitive domain of the child.

The Ontario Child Health Study

The OCHS was a cross-sectional, province-wide survey of the mental and physical health of a randomly selected sample of more than 3,000 children aged 4 to 16 in Ontario. The survey was carried out in 1983. Data were gathered on disordered health states including psychiatric disorders, chronic medical illness and the risk behaviours of smoking and alcohol and drug use. The four psychiatric disorders examined were conduct disorder, hyperactivity, emotional disorder or neurosis, and somatization. Parents and teachers were the sources of data for children aged 4 to 11, while parents and the youths themselves provided the information for the 12- to 16-year-old age group. The completion rate of items on the teacher form for the older age group was too low for use in assessing psychiatric disorder. Many high school teachers reported that no one teacher in the school knew the adolescent well enough to complete a detailed checklist on his or her behaviour. A child aged 4 to 11 who exceeded a preset scale score on either the parent checklist or the teacher checklist, or both, was determined to have a psychiatric disorder. Similarly, a youth aged 12 to 16 could qualify for a psychiatric disorder by exceeding a threshold on either the parent or the youth checklist, or both. The thresholds for all three sources were designed to maximize agreement between diagnoses based on checklist scores and diagnoses arrived at by child psychiatrists. Information was also collected on other sociodemographic, family, parental, and early development variables thought to be related to the disordered health states. Data were obtained as well on the consequences of these health states, including associated impairments (e.g., social isolation, poor peer relationships) and use of services – mental health, social, medical and school.

The design of the survey, the instruments used, the method of measuring psychiatric disorders and the initial findings are described in the first booklet in this series, *Ontario Child Health Study: Summary of Initial Findings*. A list of published papers from the OCHS as of May 31, 1989 is provided in Appendix 1.

A four-year follow-up study of the original OCHS sample will add important dimensions to the OCHS. It will, for instance, provide information on the persistence of disorder over time. It will also help establish the long-term relationship between known correlates (e.g., social assistance status) and various outcomes (e.g., psychiatric disorder). This will permit a more accurate identification of which correlates are true risk factors. The follow-up survey was begun in 1987, and preliminary results will be available in 1989.

Overview of This Report

The result of the analyses of risk indicators and outcomes are presented in four parts focusing on:

- the frequency, distribution and degree of overlap of the risk indicators-social assistance, one parent, and subsidized housing and of the outcomes (psychiatric disorder, perceived need of professional help and poor school performance);
- the strength of the associations between the risk indicators and the outcomes, and the extent to which they vary as a function of the child's sex, age and urban/rural residence;
- the extent to which family dysfunction and low income explain, or account for the relationship between a risk indicator and an outcome; and
- the issues of attributable risk, that is, the maximum extent to which an outcome can be attributed to an individual risk indicator, and prevented fraction, the maximum extent to which an outcome would be prevented by exposure to an individual protective factor.

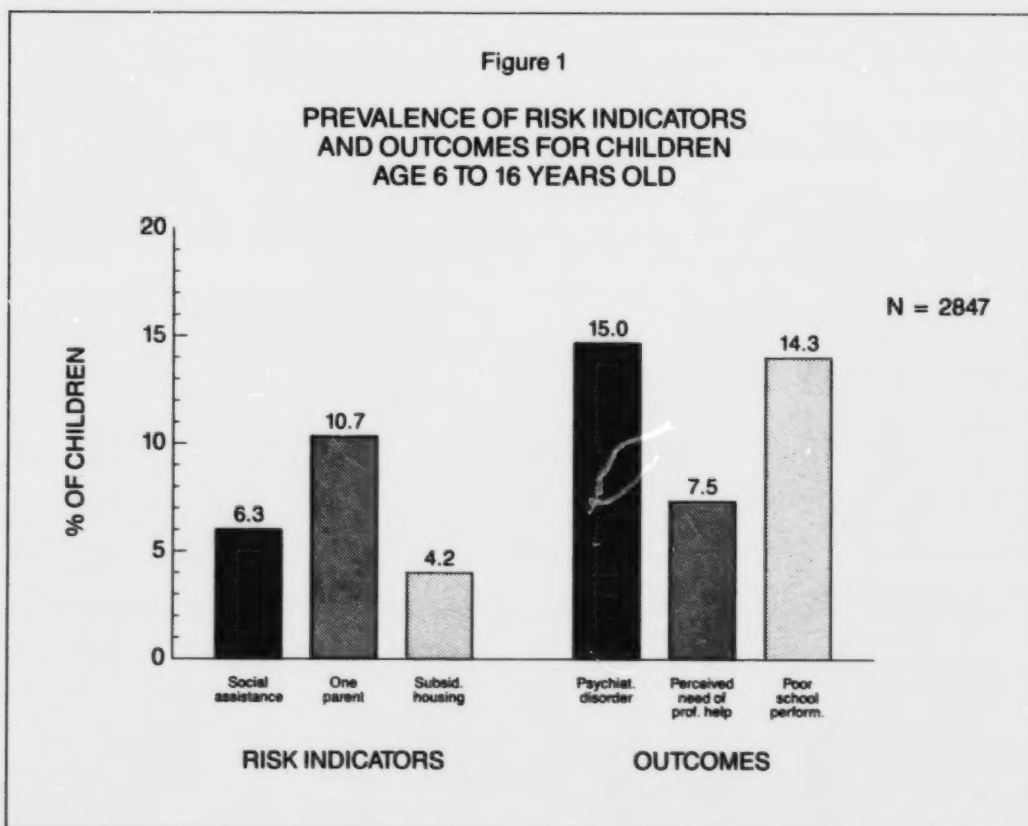
Throughout the text, there are boldface sections with comments that clarify or discuss the implications of the data. In conclusion, the highlights of the findings are reviewed along with important program implications and suggestions for future directions for further research and program approaches.

Risk Indicators and Outcomes

The data on the risk indicators and outcomes considered in this study are restricted to children aged 6 to 16 because of the large numbers of young children not attending school and the difficulty of rating poor school performance in 4- and 5-year-olds. The number of children aged 6 to 16 available for the analyses is 2847; this number varies slightly for individual variables in the different tables because of missing data.

Prevalence

Figure 1 displays the percentage of children aged 6 to 16 with each risk indicator and outcome. One parent is the most frequently occurring indicator, with over 10% of the children living in one-parent households. Over 6% of the children in the survey sample are from families on social assistance, and over 4% live in subsidized housing. The most common child outcome is psychiatric disorder (15.0%)*, followed closely by poor school performance (14.3%). Perceived need of professional help is the least common (7.5%).



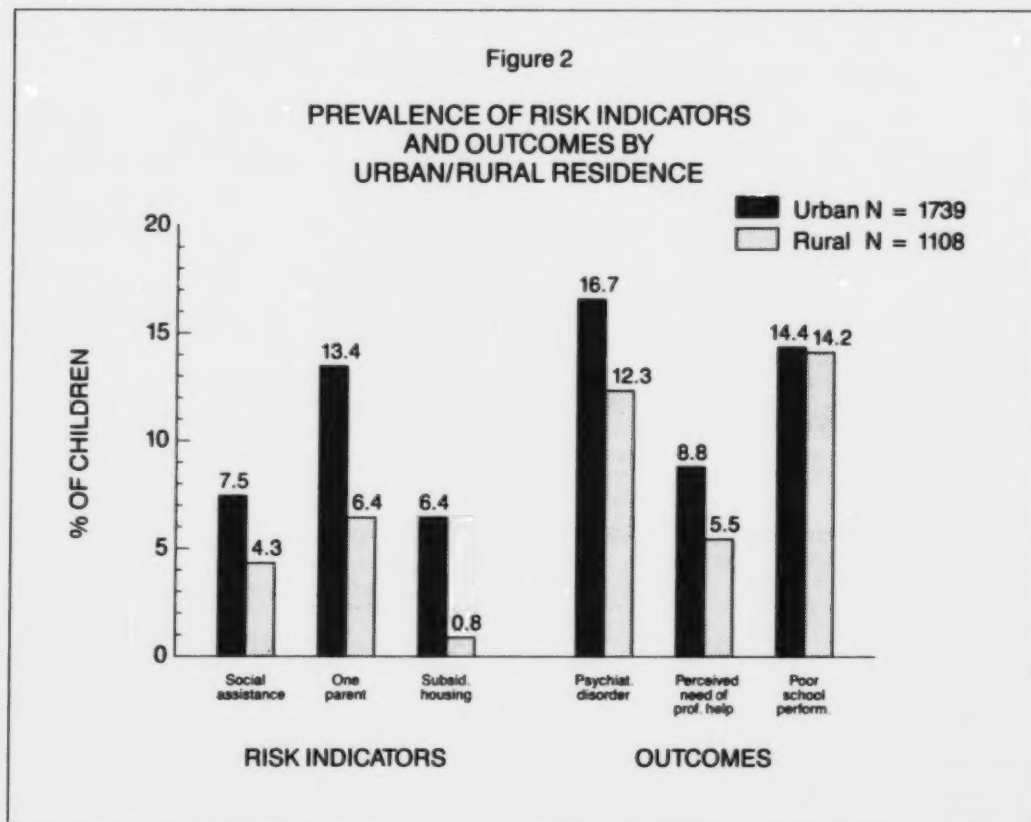
* See note in the glossary under "Psychiatric Disorder" for an explanation of this figure.

For each child in the study, assessments of psychiatric disorder and perceived need for professional help were provided by two respondents. For 6- to 11-year-olds, parent and teacher respondents were employed, while for the 12- to 16-year-old age group, parent and youth respondents were used. Poor school performance relied on parent data for the entire age span.

When two respondents are utilized, they tend to identify different groups of children with the outcome, and relatively few children are identified as having the outcome by both informants. For instance, in the case of psychiatric disorder in young children, (6- to 11-year-olds), 58.8% of the cases are selected by the teacher alone, 31.1% by the parent alone and only 10.1% by both respondents. A similar pattern of a small minority of children identified by two respondents exists for psychiatric disorder in the older age group (12- to 16-year-olds), and for perceived need for professional help in both age groups.

The finding that different respondents identify different groups of children with an outcome emphasizes the importance of obtaining information from more than one informant when evaluating problems in children. The parent, the teacher and the child should, if possible, all be utilized as informants.

It should be emphasized as well that different definitions of psychiatric disorder will result in different prevalence rates. For instance, if a more restricted definition of disorder required exceeding the thresholds on checklists from two respondents rather than one, the prevalence of psychiatric disorder for children 6 to 16 would be reduced to 3.0%. Further work is needed to learn which of several definitions of disorder is the most appropriate for different purposes, such as planning clinical services or formulating primary prevention projects. It is not known, for instance, what proportion of the 15% of children in the community, identified as having a psychiatric disorder, could and should be engaged in diagnostic and treatment services, and would benefit from them. Thus the implications of this prevalence figure for service provision are not clear.

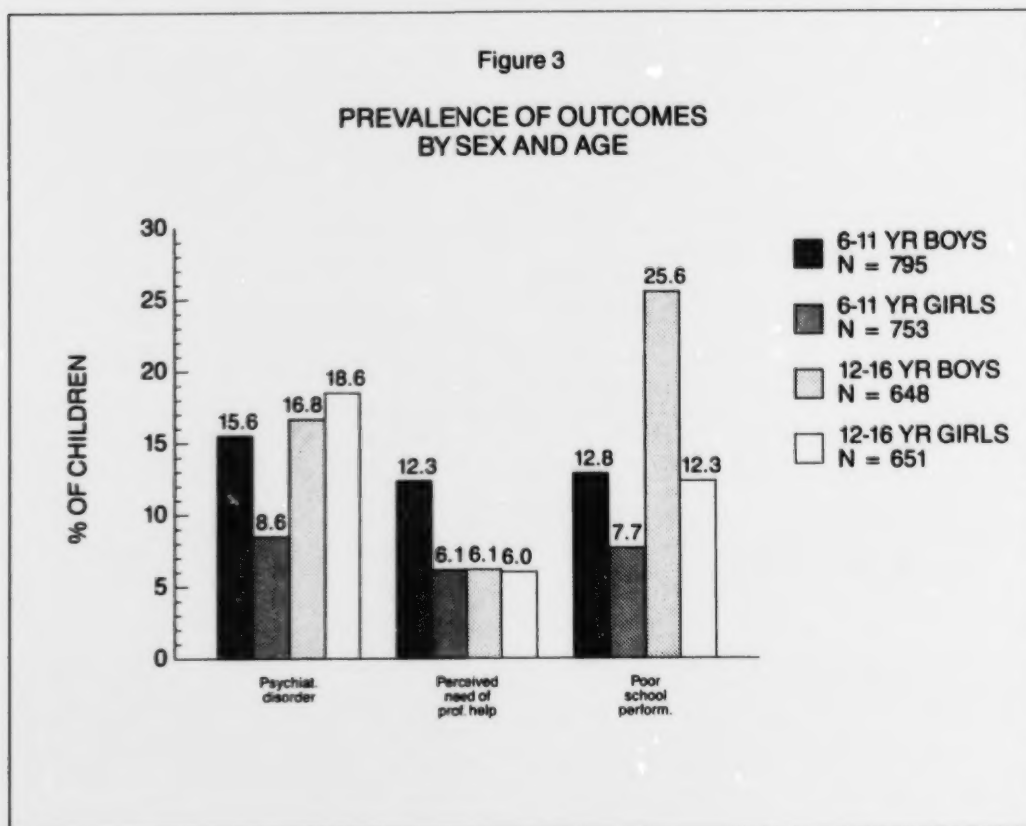


As figure 2 shows, all the risk indicators are more prevalent in urban than in rural areas and each of these urban/rural differences is statistically significant at $p < 0.001^*$, constructing in each case a 2×2 table and employing a chi-square test. Welfare is 1.7 times (7.5/4.3) as frequent, and single parent over twice as frequent. Virtually all the subsidized housing is in urban settings; the survey sample includes only 9 children in rural subsidized housing.

Among the outcomes, psychiatric disorder and perceived need of professional help are both significantly more common in urban than in rural areas ($p < 0.01$). As noted in the initial summary booklet, the increased prevalence of psychiatric disorder in urban compared to rural areas is primarily due to higher rates of teacher-identified cases of conduct disorder and hyperactivity among children aged 6 to 11.

It may be that children actually exhibit antisocial and hyperactive behaviours more often in urban schools. It is possible that the actual behaviours of the children in the two school settings are the same, but teachers in urban schools have a lower tolerance for such behaviours. In any case, the reasons for these differences need to be clarified.

The finding that urban parents are more likely to see their children as needing professional help may be partly related to the greater availability or greater awareness of mental health and social services in urban areas.



* For an explanation of the p value, see the glossary.

Figure 3 shows that the prevalence of the three outcomes varies significantly by the age and sex of the children ($p < 0.001$). In each case, a 4×2 table was constructed (each age and sex category by the presence or absence of the outcome) and a chi-square test applied. The highest rate of psychiatric disorder is in adolescent girls, which is primarily due to an upsurge in emotional disorder with depressive symptomatology, and in somatization disorder. Adolescent and younger boys have about equal prevalence rates of psychiatric disorder; in the former group, conduct disorder is most common, while in the latter group, hyperactivity and emotional disorder are equally prevalent. Young girls have the lowest prevalence of psychiatric disorder due to the low frequency of conduct disorder and hyperactivity.

Perceived need of professional help is reported most commonly for younger boys. The prevalence rates in both younger boys and girls (12.3% and 6.1%) are reasonably in line with those for psychiatric disorder (15.6% and 8.6%). However, in the older age categories, the rate of psychiatric disorder is over 2 times the rate of perceived need for professional help for adolescent boys and over 3 times the rate for adolescent girls. Indeed, adolescent girls have the highest rate of psychiatric disorder but the lowest rate of perceived need of help for emotional or behavioural problems.

Poor school performance is more common in boys than girls, with the boy:girl ratio exceeding 2:1 in the older age group. As would be expected, the rate of poor school performance increases with age, as the measure is a cumulative one, extending over the school career of the child.

The striking mismatch between the rate of psychiatric disorder and the perceived need of help in adolescents deserves further examination. It may be that some adolescents, parents and teachers attribute less importance to symptoms than clinicians do. It may also be that some adolescents who meet criteria for disorder, as judged by clinicians, do not have important persistent impairments, such as disturbed social relationships and poor school functioning. Thus some of these youths do not view themselves, or are not viewed by others, as needing professional help. Information is needed on the impairments accompanying psychiatric disorder and its persistence in adolescents. In the absence of these data, one cannot conclude that all adolescents diagnosed as having psychiatric disorder are in need of mental health services.

TABLE 1
Relationships Among Risk Indicators

	Social Assistance			One Parent			Subsidized Housing		
	Yes %	No %	R.O. ^a	Yes %	No ^b %	R.O. ^a	Yes %	No %	R.O. ^a
Social Assistance	—	—	—	41.1	2.2	30.8***	50.0	4.4	21.7***
One Parent	68.5	6.6	30.8***	—	—	—	52.5	8.6	11.7***
Subsidized Housing	33.3	2.1	21.7***	21.1	2.2	11.7***	—	—	—

^aR.O. = relative odds

^bNo = two-parent family

*** $p < 0.001$

Table 1 presents the results of the relationships among the three risk indicators. It is clear that the three indicators are strongly related to each other. For instance, 41.1 % of children living in families where there is one parent are also on social assistance. By contrast, only 2.2 % of children in two-parent families are on social assistance. The relative odds (R.O.) is the statistical measure employed to indicate the strength of the relationship between two risk indicators. Its calculation is explained in the glossary. In the case of social assistance and one parent, the relative odds of 30.8 indicates that the odds that a child in a one-parent family will be a member of a family on social assistance is 30.8 times that of a child in a two-parent family. This relationship can also be expressed as indicating that the odds of a child in a family on social assistance being a member of a one-parent family is 30.8 times that of a child in a family not on social assistance. One advantage of the relative odds is that it allows comparisons to be made of the strength of the relationship between two risk indicators that are independent of their frequencies in the population. By presenting both the group percentages and the relative odds, a more complete picture of the relationship between the two variables is provided. The statistical significance of the relationships was determined using chi-square tests. Returning to Table 1, it can be seen that in all cases, a child with one risk indicator is at much increased odds of living in a family with another indicator. The relationship is strongest between social assistance and one parent (R.O. = 30.8), next between social assistance and subsidized housing (R.O. = 21.7), and least between one parent and subsidized housing (R.O. = 11.7).

Children environmentally disadvantaged in one sociodemographic area are at great risk of being disadvantaged in others. In fact, among the psychosocially disadvantaged group, children with just one indicator of disadvantage, such as poverty or overcrowding, are in the minority.

TABLE 2
Relationships Among Outcome Variables

	Psychiatric Disorder			Perceived Need of Professional Help			Poor School Performance		
	Yes %	No %	R.O. ^a	Yes %	No %	R.O. ^a	Yes %	No %	R.O. ^a
With Psychiatric Disorder	—	—	—	65.3	10.8	15.6***	23.7	13.0	2.1***
With Perceived Need of Professional Help	29.4	2.6	15.6***	—	—	—	14.5	5.3	3.1***
With poor school performance	23.3	12.8	2.1***	31.8	13.3	3.1***	—	—	—

^aR.O. = relative odds

*** p < 0.001

The data in Table 2 show that the three outcomes, like the risk indicators are strongly related to each other. Almost two-thirds (65.3%) of children with a perceived need of professional help have a psychiatric disorder; and a child with poor school performance has 2.1 times the odds of having a psychiatric disorder compared to a child without poor school performance. While psychiatric disorder and perceived need of professional help are strongly related (R.O. = 15.6), it should be kept in mind that 7 of 10 children with psychiatric disorder are not perceived by parents, teachers, or the youths themselves as needing help.

Clinical services must be designed to recognize the strong relationships among the outcomes in the study. For example, a service to help children with psychiatric disorder that excludes the possibility of interventions for academic difficulties would be seriously incomplete since it would be expected that about 1 in 4 children with psychiatric disorder would have poor school performance. The fact that a child with one poor outcome or problem is at increased risk for other difficulties suggests that provincial ministries concerned with children must work together to launch coordinated diagnostic and intervention programs. Children tend not to have only a Ministry-specific problem or deficit. Provincial ministries concerned with children must overcome their jurisdictional and funding boundaries and sort out their overlapping responsibilities.

The Relationship Between Risk Indicators and Outcomes

The analyses in this section examine the strength of relationships between each of the risk indicators and each of the outcomes, and also explore whether or not the strength of the risk indicators varies significantly as a function of sex, age and urban/rural residence. Logistic regression analyses were used to test the statistical significance of these relationships in order to select the results to be illustrated in Tables 3, 4 and 5.

Again, the statistical measure employed to indicate the strength of relationship between the risk indicator and the outcome is the relative odds (R.O.). The R.O.'s presented in Tables 3 to 5 result from simplified or bivariate analyses, not logistic regressions. As before, the statistical significance was determined using chi-square tests.

TABLE 3
Outcome Variables for Children Living in Social Assistance
and Non-Social Assistance Families

	Social Assistance % (n)	Non-Social Assistance % (n)	Relative Odds
% with psychiatric disorder	31.2 (49)	13.8 (313)	2.8***
% perceived to need professional help	20.1 (29)	6.6 (146)	3.6***
- specified by sex			
boys	30.8 (20)	7.7 (85)	5.4***
girls	11.4 (9)	5.6 (61)	1.7
- specified by age			
6-11	28.2 (22)	7.6 (80)	4.8***
12-16	10.6 (7)	5.6 (66)	2.0
- specified by urban/rural			
urban	19.0 (20)	8.0 (106)	2.7***
rural	23.1 (9)	4.5 (40)	6.3***
% with poor school performance	30.5 (51)	13.3 (332)	2.9***
- specified by sex			
boys	26.3 (20)	18.2 (231)	1.6
girls	31.4 (31)	8.1 (99)	5.8***

*** $p < 0.001$

Table 3 presents the results, on the three outcomes, for children living in families on social assistance. Social assistance is a strong and statistically significant variable for identifying children at increased risk for psychiatric disorder. The prevalence of psychiatric disorder in children living in families on social assistance is over twice as high (31.2% vs. 13.8%) as the prevalence in children living in families not on social assistance. It should be noted, however, that over two-thirds of the children (68.8%) living in families on social assistance are free of psychiatric disorder as measured in the study. The relative odds of 2.8 indicates that the odds that a child in a family on social assistance will have a psychiatric disorder is 2.8 times that of a child living in a family not on social assistance. The n's in Table 3 refer to the number of children with both the risk indicator and the outcome. For instance, in the first row the (n) of (49) indicates that there are 49 children on social assistance with psychiatric disorder. The number 49 represents 31.2% of the children on social assistance, and thus the total number of children on social assistance (included in this analysis) is $49 \times 100/31.2 = 157$. Similar calculations can be made for other subgroups in Tables 3 to 5.

Before leaving the relationship between social assistance and psychiatric disorder, it should be noted that this relationship did not vary as a function of age, sex or urban/rural residence. Although the data are not shown here, when individual psychiatric disorders are considered, the following statistically significant results were found: social assistance is a particularly strong risk indicator for conduct disorder (R.O. = 3.2) and somatization (R.O. = 3.5) and less, but significantly so, for emotional disorder (R.O. = 2.2). In the case of hyperactivity, the strength of social assistance as a risk indicator varies significantly as a function of residence. It is a significantly stronger identifier for hyperactivity in rural settings (R.O. = 5.1) than in urban settings (R.O. = 2.6).

Table 3 also reveals that the strength of social assistance as a risk indicator for the outcome perceived need of professional help varies by sex, age, and urban/rural residence. It is a strong and significant risk indicator for this outcome for boys (R.O. = 5.4) but not for girls (R.O. = 1.7), and for younger (R.O. = 4.8) but not for older children (R.O. = 2.0). It is an indicator in both urban and rural settings but its strength is significantly greater in the rural setting (R.O.s = 2.7 and 6.3 respectively).

It should be noted that when narrow subgroups in the survey sample are the area of focus, the number of children identified becomes small. For instance, in Table 3, the numbers of girls, adolescents, and rural children who have a perceived need of professional help are small (n 's = 9, 7, and 9 respectively). When the numbers are of this magnitude, the relevant findings should be viewed with particular caution.

Further, Table 3 shows that social assistance is a stronger discriminating variable for poor school performance in girls than it is in boys. Boys living in families on social assistance are not at significantly increased risk for poor school performance compared to their male peers, while the rate among girls on social assistance is over 4 times the rate among girls not on social assistance. Social assistance is such a strong indicator of poor school performance among girls that it eliminates the commonly reported marked increased rate of more educational difficulties in boys than in girls. Among children in families on social assistance, the rates of poor school performance among boys and girls are 26.3% and 31.4% respectively. Whether girls have a similar rate of poor school performance as boys in other subgroups of children, in and outside of Ontario, is not known, nor is it known whether the findings reported here for children in families on social assistance apply to groups of children living in families on social assistance outside of Ontario.

Lastly, it should be noted in Table 3, that for the population of children living in families on social assistance, one cannot simply add the percentages of children in the groups with psychiatric disorder, perceived need of professional help, and poor school performance to obtain an overall rate of morbidity. The reason that simple addition of these percentages is incorrect is that, as noted previously, these outcomes do not identify mutually exclusive groups of children.

The reasons why social assistance status increases the rate of poor school performance in girls but not in boys are not clear. It is possible that:

- girls in social assistance families may be more likely than boys to stay home from school and look after younger siblings;
- girls in social assistance families may be more closely tied to their homes than boys. The boys may have more opportunity to participate in community skill-development programs, and thus see their future life prospects as being more independent of their home life; and
- schools may treat girls from social assistance families differently from boys from the same family setting. There might, for instance, be bias in the judgment provided by teachers about their ability to perform adequately in the school setting.

Whatever the factors are, they probably should be viewed as powerful environmental forces. Knowledge about their mechanisms of action is required to guide intervention efforts which are urgently needed.

TABLE 4
Outcome Variables for Children Living in One- and Two-Parent Families

	One-Parent	Two-Parent	Relative Odds
	% (n)	% (n)	
% with psychiatric disorder	21.7 (56)	14.2 (309)	1.7***
- specified by age			
6-11	24.4 (31)	10.8 (117)	2.5***
12-16	19.1 (25)	17.4 (106)	1.2
- specified by urban/rural			
urban	20.7 (41)	16.1 (207)	1.4
rural	25.0 (15)	11.4 (102)	2.6**
% perceived to need professional help	16.0 (39)	6.6 (139)	2.7***
- specified by age			
6-11	23.7 (27)	7.6 (77)	3.8***
12-16	9.3 (12)	5.6 (62)	1.7
% with poor school performance	21.1 (59)	13.5 (324)	1.7***
- specified by sex			
boys	21.2 (29)	18.3 (222)	1.2
girls	20.3 (28)	8.6 (102)	2.7***

** p < 0.01

*** p < 0.001

Table 4 provides information of the next risk indicator, one-parent families. Its strength as an indicator for psychiatric disorder varies by age of child and urban/rural residence. It is a strong predictor of this outcome in young children only. The data on one parent as a risk indicator for individual disorders (not shown) reveal that it is a very strong indicator of conduct disorder in younger children (R.O. = 4.9); in older children, it is not an indicator at all of conduct disorder (R.O. = 1.0). For hyperactivity, the results are similar, with one-parent being a strong risk indicator for this disorder in young children (R.O. = 2.6), but not in older children (R.O. = 0.9). One-parent is not a risk indicator for emotional disorder or somatization. Further, it is a strong indicator of children's psychiatric disorder in rural areas (R.O. = 2.6) but not in urban regions (R.O. = 1.4).

Data from Table 4 also indicate that one parent is a strong indicator of the outcome perceived need of professional help for the younger age group but not for the older children (R.O.s = 3.8 and 1.7 respectively). Lastly, Table 4 shows that one parent is a strong indicator of poor school performance in girls but not in boys (R.O.s = 2.7 and 1.2 respectively). It is not as strong a risk indicator, however, as social assistance is for poor school performance in girls.

Parenting programs, social support programs, and other interventions, might be developed for one-parent families to reduce the considerable difficulty they have in the emotional and behavioural domain with their younger children, particularly in managing effectively their aggressive behaviors. Day care and before- and after-school programs would support single parents in caring for their children. These programs should be aimed not just at single parents who work but also at providing relief for those who are at home all day. In addition, support and parent-education programs for the parents themselves could be expected to reduce their isolation, increase their social contacts, and enhance their parenting skills.

TABLE 5
Outcome for Children Living in Subsidized and Non-Subsidized Housing

	Subsidized Housing % (n)	Non-Subsidized Housing % (n)	Relative Odds
% with psychiatric disorder	30.4 (31)	14.2 (328)	2.6***
% with perceived need of professional help	22.3 (21)	6.9 (154)	3.9***
- specified by age			
6-11	36.0 (18)	7.8 (83)	6.7***
12-16	6.8 (3)	6.0 (71)	1.7
% with poor school performance	25.2 (28)	13.8 (350)	2.1**
- specified by age			
6-11	13.6 (9)	10.2 (136)	1.4
12-16	42.2 (19)	18.2 (214)	3.3***

** p < 0.01

*** p < 0.001

The last risk indicator examined was subsidized housing. The effects of place of residence (urban vs. rural) on the strength of subsidized housing as an identifier variable could not be assessed owing to the rarity of such housing in the rural areas.

Table 5 indicates that subsidized housing is a strong risk indicator for psychiatric disorder (R.O. = 2.6). Almost one-third of the children in subsidized housing (30.4%) have a psychiatric disorder, which is over twice the rate in non-subsidized housing (14.2%).

The strength of subsidized housing as a risk indicator of psychiatric disorder does not vary significantly as a function of age and sex. However, in the case of individual disorders (not shown), subsidized housing is a stronger risk indicator for conduct disorder in younger (R.O. = 5.3) than in older children (R.O. = 2.2). It is also an indicator of hyperactivity (R.O. = 2.1) and somatization (R.O. = 3.0). Its strength in emotional disorder varies greatly as a function of the age of the children, being a much stronger indicator in the younger age group (R.O. = 6.3) than in the older (R.O. = 1.1).

Further, Table 5 shows that subsidized housing is a strong indicator for perceived need of professional help in younger children. The number (3) of older children in subsidized housing in need of professional help is too few to assess its strength as an indicator in that age group of this outcome.

Lastly, Table 5 indicates that the strength of subsidized housing as a risk indicator for poor school performance varies significantly as a function of age. It is a strong and significant indicator in the older age group (R.O. = 3.3), but is not a significant indicator in the younger age group (R.O. = 1.4). However, the small number of children, aged 6 to 11, with poor school performance living in subsidized housing (n = 9) emphasizes the need for replication of this result.

Psychiatric disorder is markedly prevalent among children in subsidized housing affecting almost one-third. Over 40% of older children in subsidized housing have poor school performance. Also, a large proportion of young children in this setting are perceived as needing professional help for emotional and behavioural problems. In Ontario, the vast majority of children in subsidized housing live in large complexes. This raises the possibility that the organizational structure and experience of living in these complexes contribute to psychiatric disorder and poor school performance.

Intervention aimed at raising the quality of life of children in public housing must take into account the high risk of psychiatric disorder in this setting for both sexes and age groups and for poor school performance in older children. Since these children live in clearly defined areas, community prevention programs (for example, first-rate recreation programs) could be launched and rigorously evaluated.

It should be noted that it is possible, by using combinations of risk indicators, to identify subgroups of children with a much increased risk of an undesirable outcome. For instance, by focusing on children living in subsidized housing who are also members of families with a single parent who is on welfare, the relative odds of such children being perceived in need of professional help is 10.1 compared to children living in families with none of these characteristics. On the one hand, this strategy can increase the efficiency of prevention projects that use a population approach to identify and reach clients. On the other hand, the trade-off is that high-risk populations identified in this way contain relatively few children in total. Thus a prevention program of this type, if successful, may not reduce in an important way the overall incidence of the undesirable outcome in the population at large. However, several of these programs aimed at different high-risk groups could, if successful, have an important beneficial cumulative effect.

The Strength of Association Between Risk Indicators and Outcomes Controlling for Low Income and Family Dysfunction

As noted earlier, the major purpose of the booklet is to examine the strength of the risk indicators in identifying groups of children with increased rates of the three outcomes. This section deals with the secondary goal, namely, to explore the causal mechanisms by which children identified by an indicator attain their high-risk status. To do this, we used logistic regressions to examine the relative strength of association of the three risk indicators with each outcome. By using this statistical technique, we could look at whether the risk indicators had some independent effect (i.e., main effect); whether other risk indicators, namely low income and family dysfunction, were more strongly related with the outcome than the three indicators highlighted in this booklet; and whether or not the strength of association of each of the three risk indicators varied significantly by other variables such as the other two of the three risk indicators and age, sex, or urban/rural residence (i.e., interaction).

As this section will show, risk indicators can lose much of their association with the outcome when additional variables are taken into account. It should be emphasized that since the information in the OCHS is cross-sectional (collected at one point in time), the determination of any causal relationships is tentative. One other point should be stressed. The results obtained on logistic regression are heavily dependent on the variables selected for analysis. Thus, the strength of association between the same variable and outcome may be different depending on the variables used in the analysis.

For each outcome in Tables 6 through 8, tests of statistical significance were carried out in each logistic regression to evaluate all possible two-way interactions among the three risk indicators. Also tested were the various interactions that had been found to be significant for each outcome in the earlier analyses examining the strength of relationship between each risk indicator and outcome as a function of age, sex and urban/rural residence. Only those interactions which have been found to be statistically significant are included in Tables 6 through 8. In these tables the relative odds are displayed for all the risk indicators, control variables and interactions. Those relative odds which are significantly different from 1.0 are being marked with an asterisk.

Table 6 summarizes the strength of association between the risk indicators, the control variables and psychiatric disorder. In addition to interactions between each of the indicators, testing was carried out for single parent by urban/rural status and by age of the child. Low income and family dysfunction have significant independent effects in predicting psychiatric disorder (R.O.s = 1.8 and 2.9 respectively). For social assistance, the relative odds is greater than 1.0 but non-significant. The unadjusted or crude relative odds between social assistance and psychiatric disorder is 2.8 (see Table 3). However, when the effects of other variables are taken into account, the relative odds is reduced in magnitude to 1.7 which is not statistically different from 1.0 as shown in Table 6.

Much of the strength of the relationship between social assistance and psychiatric disorder is accounted for by low income and family dysfunction. Although the results as presented do not permit examination of this point, low income rather than family dysfunction accounts for much of the relationship between social assistance and psychiatric disorder. For instance, when only one control variable, low income, is entered into the model (and the other control variable family dysfunction is not) the relationship between social assistance and psychiatric disorder while greater than 1.0, is non-significant (1.8). However, when the reverse is carried out (family dysfunction is entered into the model but low income is not), the relationship between social assistance and psychiatric disorder remains strong and significant (R.O. = 2.3). Subsidized housing has no statistically significant independent effect in predicting psychiatric disorder. The relationship between single parent and psychiatric disorder varies by place of residence; it is stronger in rural (R.O. = 2.0) than in urban (0.7) areas. (No asterisk is shown because the comparison is between R.O. = 2.0 and R.O. = 0.7. Please see discussion and illustration of an interaction in the glossary). Lastly, the relationship between single parent and psychiatric disorder differs by age.

TABLE 6
Strength of Association Between Risk Indicators,
Control Variables and Psychiatric Disorder

Variable	Relative Odds
Control	
Low income	1.8*
Family dysfunction	2.9*
Main Effects of Risk Indicators	
Social Assistance	1.7
Subsidized housing	1.4
Interactions	
One parent by urban/rural	
• Urban	0.7
• Rural	2.0
One parent by age	
• 6-11	1.8
• 12-16	0.8

* $p < 0.05$

Social assistance and subsidized housing as predictors of psychiatric disorder in children are reduced to the non-significant range when the impact of low income and family dysfunction is taken into account. Thus, the association of these two risk indicators with psychiatric disorder is explained in large part by the control variables. Interventions based on a knowledge of the mechanisms by which low income and family dysfunction lead to increased rates of psychiatric disorder in children could be expected, if successful, to reduce significantly the harmful effects of social assistance status on children's emotional and behavioural adjustment.

This leads to two suggestions. First, income supplement programs should be implemented and evaluated for their impact on the mental health of children. Second, it is important to determine to what extent high quality programs in the community can reduce the ill effects of a disadvantaged home environment.

TABLE 7
Strength of Association Between Risk Indicators,
Control Variables and Perceived Need of Professional Help

Variable	Relative Odds
Control	
Low income	2.6*
Family dysfunction	2.8***
Main Effects of Risk Indicators	
One parent	1.6
Other Main Effects	
Boys	1.5*
Interactions	
Social assistance by urban/rural	
• Urban	0.7
• Rural	2.4
Subsidized housing by age	
• 6-11	2.7*
• 12-16	0.5

* $p < 0.05$

*** $p < 0.001$

In the case of perceived need of professional help, the following specific interactions were tested: social assistance by sex, by age and by urban/rural status, one parent by age, and by sex, and subsidized housing by age. Table 7 shows that both low income and family dysfunction contribute significantly to the prediction of the perceived need of professional help as does male sex, but one parent does not. The relationship between social assistance and perceived need of professional help is significantly stronger in rural compared to urban areas. Lastly, subsidized housing is a strong contributor to predicting this outcome for the younger age group but not for the older group.

The finding that subsidized housing is a strong independent predictor of perceived need of professional help only for younger children, deserves further study.

Lastly, in the case of poor school performance, the following specific interactions were examined: social assistance by sex, one parent by sex, and subsidized housing by age. Table 8 shows that for poor school performance, low income (but not family dysfunction), has a significant predictive relationship ($p < 0.05$).

One parent as a main effect is not significantly related to poor school performance. Furthermore, social assistance and subsidized housing do not enter the model as main effects but three interactions do. Among children on social assistance, living in non-subsidized housing is associated with a significant risk for poor school performance. In addition, the strength of the relationship between social assistance status and poor school performance varies as a function of sex: it is stronger in girls than in boys (R.O.s = 3.1 and 0.8 respectively). Among children living in subsidized housing the risk of poor school performance is higher for adolescents (R.O. = 1.8) than for preadolescents (R.O. = 0.7).

TABLE 8
**Strength of Association Between Risk Indicators,
 Control Variables and Poor School Performance**

Variable	Relative Odds
Control	
Low income	1.9*
Family dysfunction	1.1
Main Effects of Risk Indicators	
One parent	0.9
Interactions	
Social assistance by subsidized housing	
• Subsidized housing	0.8
• Non-subsidized housing	3.2*
Social Assistance	
• Boys	0.8
• Girls	3.1*
Subsidized housing by age	
• 6-11	0.7
• 12-16	1.8

* $p < 0.05$

While family dysfunction has a strong independent effect in predicting psychiatric disorder, it plays no significant role in the prediction of poor school performance. Thus, these two major types of childhood problems, one in the affective and behavioural realm and the other in the cognitive area, appear to have somewhat different origins. Improving family functioning could be expected to have a beneficial effect on children's adjustment but not necessarily on their school performance.

The finding that children on social assistance in non-subsidized compared to subsidized housing are significantly more disadvantaged in terms of school performance deserves further examination. To understand the mechanisms accounting for this finding, information needs to be collected on the cognitive and other abilities of these two groups of children on social assistance and on the characteristics of the schools they attend. It may be, for instance, that children living in families on social assistance are an indistinguishable part of a homogeneous population in schools serving subsidized housing areas, but in other schools are a distinctly disadvantaged group in terms of cognitive functioning and school readiness; or, perhaps, schools not serving subsidized housing children have higher academic standards and the environment is less hospitable to children on social assistance. Clearly, data are needed to determine which of these, and other potential causal hypotheses are indeed true.

Lastly, the interaction between social assistance and sex suggests that, in the case of girls, the effect of social assistance status on school performance is, to a large extent, independent of the effects of low income and family dysfunction. Interventions to ameliorate this situation should focus on areas other than income level and family functioning.

Overall, there appears to be a strong need for preventive interventions early in the lives of children on social assistance. Access to quality day-care programs for children on social assistance may help ensure that they do not enter school at a behavioural disadvantage and, especially for girls, a cognitive disadvantage. Also, day care for the children would help minimize any problem of girls staying home to look after their younger siblings. Finally, it would assist the mothers to gain skills or work outside the home, and play a part in raising their self-esteem and their potential income.

Attributable Risk and Prevented Fraction

Further analyses explored the proportion of an outcome attributable to individual risk indicators, as well as factors that protect children against an outcome in the presence of risk indicators. The importance of the concept of "attributable risk" lies in its relevance to primary prevention programs. The attributable risk allows the investigator to estimate the maximum proportion of an outcome in a population that could be prevented if the effects of a specific risk indicator are nullified. Its magnitude is dependent on both the prevalence of the risk indicator in the population and the strength of the relationship between the risk indicator and the outcome of interest. In the case of protective factors, the term "prevented fraction" is used to refer to the proportion of cases that could be prevented by the protective factor.

Figures 4 through 6 display the attributable risks of the three risk indicators and the two control variables for each of the three outcomes. Also displayed in these figures are the prevented fractions of the three outcomes for two variables known to have a protective influence (gets along well with others and good peer relationships). These values are the maximum proportions because they assume that the risk indicators themselves are causal and act completely independently, which, of course, we know is not true. In the case of social assistance and psychiatric disorder, for instance, to realize the maximum attributable risk for this variable (8.7%), the intervention must eliminate not only social assistance status but also the mechanisms by which social assistance, as a risk indicator, causes psychiatric disorder.

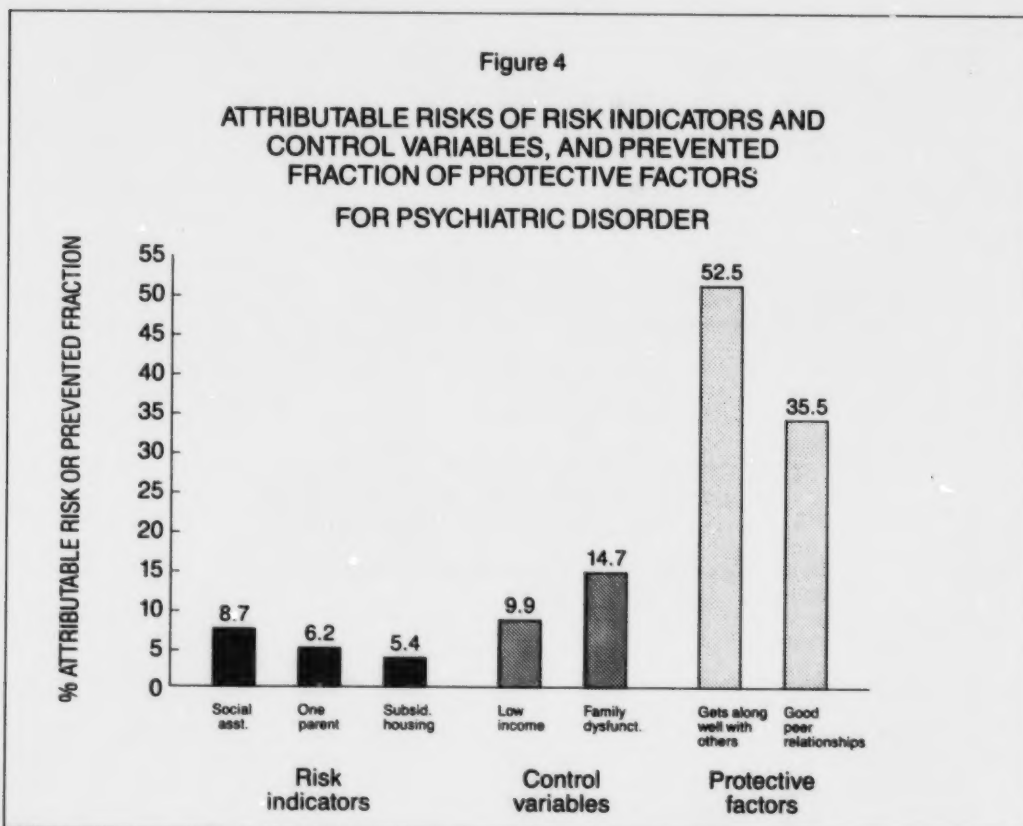


Figure 5

**ATTRIBUTABLE RISKS OF RISK INDICATORS AND
CONTROL VARIABLES, AND PREVENTED
FRACTION OF PROTECTIVE FACTORS
FOR PERCEIVED NEED OF PROFESSIONAL HELP**

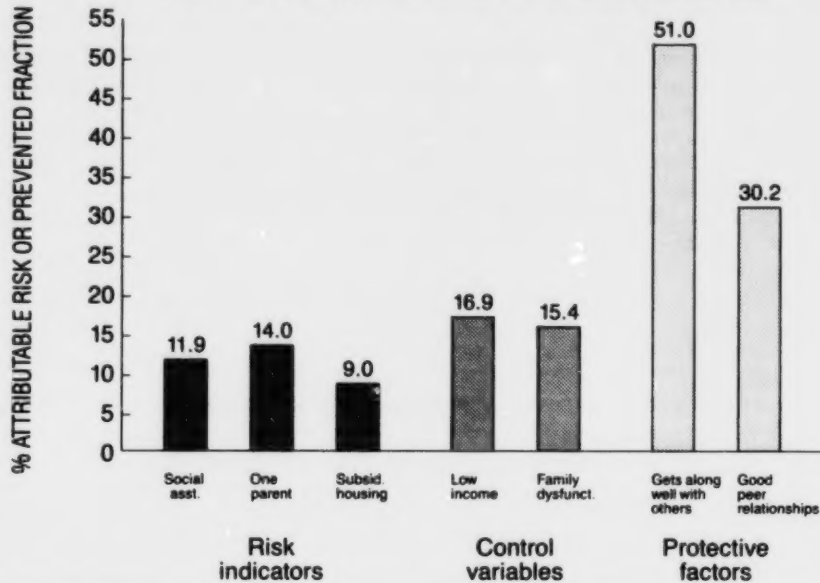


Figure 6

**ATTRIBUTABLE RISKS OF RISK INDICATORS AND
CONTROL VARIABLES, AND PREVENTED
FRACTION OF PROTECTIVE FACTORS
FOR POOR SCHOOL PERFORMANCE**

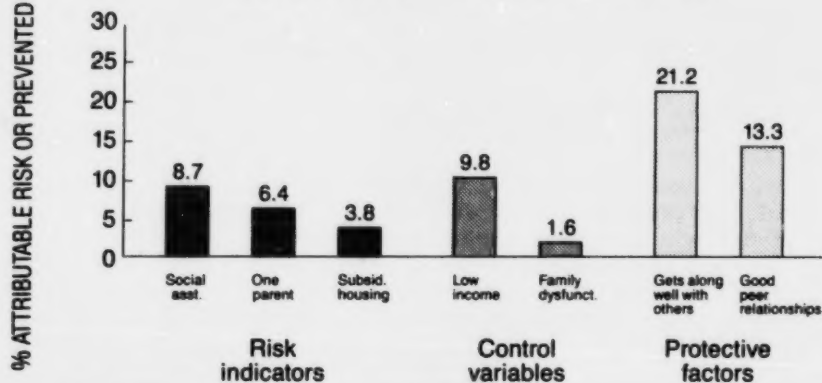


Figure 4 shows that for psychiatric disorder, family dysfunction has the highest attributable risk (14.7%) and subsidized housing the least (5.4%). In the case of perceived need of professional help in Figure 5, all the attributable risks are over 9%, with low income (16.9%) and family dysfunction (15.4%) being the highest. Finally, for poor school performance (Figure 6), family dysfunction, by contrast, has negligible attributable risk (1.6%). Low income and social assistance have the highest attributable risks for this outcome, with values of 9.8% and 8.7% respectively.

For psychiatric disorder, "gets along well with others" shows a high prevented fraction (52.5%). If this protective factor, and the mechanisms by which it operates to reduce the frequency of psychiatric disorder, could be effectively fostered in children, disorder might be reduced by over 50%. The figure is an indication of both the strong relationship between this protective factor and the outcome and the relatively high prevalence of this factor. Gets along well with others also shows a very high prevented fraction for perceived need for professional help (51.0%). In the case of poor school performance, this protective factor shows a lower but substantial prevented fraction (21.2%).

Caution is needed in interpreting the magnitude of the prevented fraction for the two protective factors. From our current data, it cannot be concluded that the protective factors antedate the onset of psychiatric disorder and are causally related to its prevention. For example, the inability to get along with others could be part of the disorder itself or a consequence of it. Nevertheless, the results suggest that effective intervention programs aimed at improving social skills might reduce substantially psychiatric disorder and perceived need of professional help.

Attempts should be made to develop and evaluate programs fostering protective factors in children, especially those from disadvantaged circumstances. Possibilities include the provision of quality day care, skill development and academic programs. These could be expected to improve social skills and self-esteem as well as academic functioning.

When comparing the merits of primary prevention initiatives, attributable risk is an important criterion to be considered. In many instances, a trade-off will be involved. Efforts to narrow down a population to target children at greatest risk for the outcome or condition to be prevented may involve a lowering of the attributable risk. For instance, low birth weight is a variable that has a significant independent effect in predicting psychiatric disorder but, because of its low frequency, its attributable risk is small (3.7%). Eliminating low birth weight in children would not reduce the frequency of psychiatric disorder to any great extent.

Highlights and Major Program Implications

Some key findings about children at risk presented in this report are:

- Risk indicators tend to overlap, as do outcomes.
- Social assistance, in particular, is a very strong risk indicator, with a prevalence rate of psychiatric disorder in children on social assistance of 31.2% and a prevalence rate of poor school performance in welfare girls of 31.4%.
- There is a considerable mismatch between the rate of psychiatric disorder in adolescents and their perceived need of professional help.

The further analyses cast additional light on the association between risk indicators and outcomes:

- The strength of the risk indicators varies by outcome and by population subgroup. Social assistance, for example, is a strong indicator of poor school performance in girls. One parent is a strong indicator of psychiatric disorder in young children.
- Although the indicators are useful for identifying populations at risk, they do not necessarily identify causal relationships. The mechanisms or variables accounting for the relationships between risk indicators and outcomes vary by indicator and outcome. For example, once the impact of low income and family dysfunction is taken into account, one parent has no independent effect in predicting any of the outcomes. On the other hand, social assistance has a significant effect in predicting poor school performance among children in non-subsidized housing and among girls. Family dysfunction has a strong independent effect in the prediction of psychiatric disorder and perceived need of professional help, but plays no significant role in the prediction of poor school performance.

The analyses of attributable risk and prevented fraction extend these findings further:

- In the case of psychiatric disorder and perceived need of professional help, family dysfunction presents a high attributable risk. In the case of poor school performance, however, it presents with almost no attributable risk while low income has the highest attributable risk.
- The ability to get along well with others has a high prevented fraction for all three outcomes, although caution is required in interpreting this finding because causation cannot be determined from these cross-sectional data.

The findings of the OCHS have important program implications suggesting a need to:

- design health, social and educational services to recognize the overlap among the outcomes in the study, in particular between psychiatric disorder and poor school performance;
- expand quality child-care programs as a preventive measure against poor school performance and emotional and behavioural problems, particularly for poor children regardless of whether their parents are working;
- implement and evaluate income supplement programs to determine if improving the financial status of families benefits the social, emotional and behavioural adjustment of children;
- develop programs to raise the quality of life of children in public housing (for example, first-rate recreation programs);
- target parenting and child-care programs to assist lone parents with young children;
- evaluate the implications of high rates of disorder among adolescent girls in combination with low rates of perceived need for professional help; and
- develop and evaluate programs fostering child-protective social skills.

Future Directions

The data in this study suggest both lines of further inquiry and promising program approaches. Increased knowledge in two areas would enable primary prevention programs to be carried out more efficiently and effectively.

A major need is for detailed information about the causes of the association of a risk indicator, such as social assistance status, with childhood problems. It is clear that the mechanisms associated with a given indicator will not necessarily be the same for different outcomes, for example, psychiatric disorder and poor school performance. The more accurate and detailed the knowledge about risk indicators and their mechanisms of action in causing different types of childhood problems, the more effective the interventions are likely to be. Prospective studies, such as the follow-up of the OCHS, are particularly valuable in this regard because they permit more accurate identification of the variables that antedate an outcome and are likely to be risk factors for it.

A second area where knowledge is needed is in distinguishing between persistent and non-persistent psychiatric disorder. Prevention programs should focus on preventing disorders that persist over time rather than on short-lived temporary conditions. Similarly, treatment attention should be directed at serious, persistent disorders in children. Again, longitudinal studies provide the ideal design to gain this type of data and the 4-year OCHS follow-up should provide useful insight into this.

Such knowledge of the mechanisms causing disorders, and of the natural history of the disorders, is vital for the setting up and carrying out of promising primary prevention programs. These programs themselves should, of course, be rigorously evaluated. The overall goal must be to develop a number of rational, effective and reasonably-priced prevention programs that raise the quality of life for groups of children at risk and their families, and improve their life chances.

Glossary

Attributable Risk

the maximum proportion of an outcome attributable to an individual risk factor.

Birth Weight

See **Low Birth Weight**.

Bivariate

A method of analysis concerning the relationship between two variables, e.g., the strength of association between social assistance and poor school performance.

Checklist

A survey instrument that contains a list of descriptive statements about a child, and asks the respondent to check whether each statement is never or not true, sometimes or somewhat true, or often or very true.

Chi-Square Test (χ^2)

A method of testing to determine whether two or more series of proportions or frequencies are significantly different from a theoretically expected distribution.

Conduct Disorder

See **Psychiatric Disorder**.

Control Variable

In this booklet refers to another potential risk indicator, namely, low income or family dysfunction which may have a strong relationship with an outcome.

Dichotomous

Variables that are scored in only two ways, e.g., present or absent.

Emotional Disorder

See **Psychiatric Disorder**.

Etiologic

Causal.

Family Dysfunction

Defined from a twelve-item scale derived from the McMaster Family Assessment Device (FAD), which assesses family functioning on six dimensions: problem solving, communication, roles, affective responsiveness, affective involvement, and behaviour control. The scale divides the sample into two groups at a cut point derived from an earlier study to discriminate maximally between clinic and nonclinic families.

Gets Along Well With Others

Defines whether or not a child, over the last six months, has been rated as getting along very or quite well with peers, teacher(s) and other family members. Parent responses are used for children aged 6 to 11 and youth self-reports for children aged 12 to 16.

Good Peer Relationship

Defines whether or not a child has close contacts and relations with friends, with the cut-point for a positive response being set at having more than two close friends and interacting with them more than twice a week. Parent responses are used for children aged 6 to 11 and youth self-reports for children aged 12 to 16.

Hyperactivity

See **Psychiatric Disorder**.

Income

See **Low Income**.

Interaction

Difference in the effect of one factor according to the level of another factor. For example, in the logistic regression which looked at the outcome of poor school performance (Table 8), the interaction of social assistance and sex was statistically significant. This indicates that the association between living in a family on social assistance and doing poorly at school is significantly different for boys and girls. In this particular case, girls living in families on social assistance are significantly more likely to be performing badly at school than boys (R.O.'s = 3.1 and 0.8 respectively). When the interaction is significant and thus appears in the table, it means only that the two values are statistically significantly different from each other. An asterisk indicates which, if any of the two values, are different from 1.0. In the example noted, the R.O. of 3.1 is significantly different from 1.0, but 0.8 is not.

Logistic Regression

A statistical tool for evaluating the strength of association between a set of predictor variables and a dichotomous outcome. For example, in Table 6, the three markers (welfare, subsidized housing and single parent) as well as low income and family dysfunction are all treated as predictor variables. The outcome is psychiatric disorder. The relative odds of each reflects its strength of association with the outcome in the presence of the effects of the other variables.

Low Birth Weight

Defines a child who weighed less than 2500 grams at birth.

Low Income

Defines a family with a total income for 1982, before taxes, of \$10,000 or less.

Main Effect

Defines a relationship between a variable and an outcome whose strength does not vary significantly as a function of the different levels of other variables.

One Parent

Defines a family with only one parenting figure currently in the home.

p Value

p value followed by the symbol < (less than) and a decimal notation (e.g., 0.05 or 0.01) is a statement of the probability that the effect observed could have occurred by chance. In most biomedical and epidemiological work, a result with a probability of less than 5% ($p < 0.05$) or 1% ($p < 0.01$) is considered sufficiently unlikely to have occurred by chance to justify the designation **statistically significant**.

Perceived Need of Professional Help

Defines a child from 6 to 11 years old who is identified by his/her parent or teacher as having had emotional or behaviour problems over the last six months for which the parent or teacher feels professional help is or was needed. In the case of 12-to 16-year-olds, the identification is made by a self or parent report.

Poor School Performance

Defines a child who has failed a grade and/or received full-time remediation or special class placement at some time during his/her school career.

Prevented Fraction

The maximum proportion of an outcome that would be prevented by exposure to an individual protective factor.

Primary Prevention

Reduction of the incidence of new cases of disorder, dysfunction or disability through activities designed to strengthen individual ability to cope or to modify the stressful environment.

Protective Factor

A variable that is believed to cause reduction in the frequency of an outcome. This means that a variable that qualifies as a protective factor must antedate the outcome. See also *Gets Along Well With Others* and *Good Peer Relationships*.

Psychiatric Disorder

Defines a child who has been identified as having one or more of the following childhood psychiatric disorders: conduct disorder, hyperactivity, emotional disorder (or neurosis), or somatization. For the 12 to 16 age group, the diagnosis is based on information from the youth self-report and parent responses. For the 6 to 11 age group, the information is from the parent and teacher responses. A positive diagnosis is possible in each age group based on a score above the threshold from either or both sources. A child, not to have a disorder, must score below both thresholds. Thresholds for disorders in checklist data were selected that maximized agreement between checklist data and child psychiatrists' diagnoses. The child psychiatrists, in making their diagnoses, were instructed to use a definition of disorder that emphasized impairment in functioning in the child and/or distress to the child, family or community.

For the purpose of the types of analyses included in this booklet, a more stringent definition of emotional disorder was used than in the *Ontario Child Health Study: Summary of Initial Findings*. The thresholds on the checklists for emotional disorder were raised, and this, combined with the restricted age range of 6 to 16, resulted in the identification of 15.0% of children with psychiatric disorder. This was done to increase the accuracy of the estimates of the strength of relationships between psychiatric disorder and other variables. However, 15% is not the true prevalence rate of psychiatric disorder. The most accurate estimate of the prevalence rate of psychiatric disorder, as defined in the OCHS study on the basis of clinical opinion, for children aged 4 to 16, is 18.1%, the rate reported in the first booklet and other publications.

DSM-III criteria guided the selection of checklist items used to measure individual psychiatric disorders. For conduct disorder, the socialized axis was dropped from the DSM-III criteria; for hyperactivity, the DSM-III criteria were unchanged; for emotional disorder, various DSM-III criteria for depression, anxiety and obsessive-compulsive disorder were collapsed; for somatization, the major DSM-III criterion of somatic symptoms without organic cause was divided into two - distressing recurrent symptoms and perception of oneself as sickly. For all diagnoses, the age of onset criteria were replaced by occurrence in the past six months as the time period for defining disorder.

Conduct Disorder

Defines a child who exhibits behaviour satisfying either or both of the following criteria: a persistent pattern of physical violence against persons or property; severe violation of social norms, which can be expressed as truancy, stealing, running away from home, and disobedience at school.

Hyperactivity

Defines a child who exhibits behaviour satisfying the following criteria: inattentiveness, impulsivity and hyperactivity.

Emotional Disorder or Neurosis

Defines a child who exhibits behaviour from one or more of the following categories of disorder: overanxious disorder; affective disorder; obsessive-compulsive disorder.

Somatization

Defines a child who exhibits behaviour satisfying both of the following criteria:
perception of oneself as sickly;
distressing recurrent somatic symptoms, such as constipation, headaches, nausea, rashes and vomiting, without any evident physical cause.

Relative Odds (R.O.)

A measure of the strength of association between two dichotomous variables. For example, if the relationship between a risk indicator and an outcome is summarized in a 2×2 table, as follows:

		Outcome	
		Present	Absent
Risk Indicator	Present	30	10
	Absent	40	60

the odds for the outcome being present if the marker is present are 3:1, and the odds for the outcome being present if the marker is absent is 4:6. The relative odds is the ratio of these two odds, 3:1 over 4:6, which is solved by cross-multiplication, i.e., $(3 \times 6) - (1 \times 4)$ to give the result 18 - 4. This is the likelihood of the outcome in the presence as compared to the absence of the marker. It is usually reported as a single figure, i.e., 18 - 4 or a R.O. of 4.5.

Risk Factor

A variable that is believed to be causally related to the outcome. This means that a variable that qualifies as a risk factor must antedate the outcome.

Risk Indicators

Factors that identify groups of children at risk. See **One Parent, Social Assistance and Subsidized Housing**.

Significant

See **p Value**.

Single-Parent

Defines a family with only one parenting figure currently in the home.

Social Assistance

Defines a family who received any income during 1982 in the form of public assistance, such as mother's allowance or other social assistance programs.

Somatization

See **Psychiatric Disorder**.

Statistically Significant

See **p Value**.

Subsidized Housing

Defines a family currently living in a dwelling where the rent is subsidized by the government.

Urban/Rural Residence

Urban areas are those with a population of 25,000 or more, including 1981 census metropolitan areas having a population of more than 100,000 and census agglomeration areas having a population of more than 25,000. Rural areas include small urban areas of less than 25,000 and non-urban areas such as small towns, villages, farming communities, and the rural fringe areas of census metropolitan and census agglomeration areas with a population density less than 400 people per square kilometre.

Appendix 1

List of Publications from Ontario Child Health Study

Published: 1986

Boyle, M.H. and Offord, D.R. Smoking, Drinking and Use of Drugs Among Adolescents in Ontario: Prevalence, Patterns of Use and Sociodemographic Correlates. *Canadian Medical Association Journal*, 135:1113-1121, 1986.

Cadman, D., Boyle, M.H., Offord, D.R., Szatmari, P., Rae-Grant, N., Crawford, J. and Byles, J. Chronic Illnesses, Functional Conditions and Limitations in Ontario Children: Findings of the Ontario Child Health Study. *Canadian Medical Association Journal*, 135:761-767, 1986.

Ontario Child Health Study: Summary of Initial Findings. Ministry of Community and Social Services, Queen's Printer for Ontario, 1986.

Offord, D.R., Alder, R.J. and Boyle, M.H. Prevalence and Socio-demographic Correlates of Conduct Disorder. *American Journal of Social Psychiatry*, VI:272-278, 1986.

Offord, D.R. and Boyle, M.H. Problems in Setting up and Executing Large-Scale Epidemiological Studies. *Psychiatric Developments*, 4:257-272, 1986.

Published: 1987

Boyle, M.H., Offord, D.R., Hofmann, H.F., Catlin, G.P., Byles, J.A., Cadman, D.T., Crawford, J.W., Links, P.S. and Rae-Grant, N.I. Ontario Child Health Study: I. Methodology. *Archives of General Psychiatry*, 44:826-831, 1987.

Cadman, D., Boyle, M.H., Szatmari, P. and Offord, D.R. Chronic Illness, Disability, and Mental and Social Well-Being: Findings of the Ontario Child Health Study. *Pediatrics*, 79:805-813, 1987.

Offord, D.R., Boyle, M.H. and Jones, B.R. Psychiatric Disorder and Poor School Performance Among Welfare Children in Ontario. *Canadian Journal of Psychiatry*, 32:518-525, 1987.

Offord, D.R., Boyle, M.H., Szatmari, P., Rae-Grant, N.I., Links, P.S., Cadman, D.T., Byles, J.A., Crawford, J.W., Munroe Blum, H., Byrne, C., Thomas, H. and Woodward, C.A. Ontario Child Health Study: II. Six-Month Prevalence of Disorder and Rates of Service Utilization. *Archives of General Psychiatry*, 44:832-836, 1987.

Published: 1988

Boyle, M.H. and Offord, D.R. Prevalence of childhood disorder, perceived need for help, family dysfunction and resource allocation for child welfare and children's mental health services in Ontario. *Canadian Journal Behavioral Science*, 20(4):374-388, 1988.

Byles, J.A., Byrne, C., Boyle, M.H. and Offord, D.R. The General Functioning Scale of the Family Assessment Device: Reliability and Validity. *Family Process*, 27:97-104, 1988.

Cadman, D. T., Boyle, M.H. and Offord, D.R. OCHS: Social Adjustment and Mental Health of Siblings of Children with Chronic Health Problems. *Pediatrics*, 9:117-121, 1988.

Joffe, R.T., Offord, D.R. and Boyle, M.H. Ontario Child Health Study: Suicidal Behavior in Youth Aged 12 - 16 years. *American Journal of Psychiatry*, 145(11):1420-1423, 1988.

Munroe Blum, H., Boyle, M.H. and Offord, D.R. Single Parent Families - Child Psychiatric Disorder and School Performance. *Journal of the American Academy of Child and Adolescent Psychiatry*, 27(2):214-219, 1988.

Offord, D.R. and Boyle, M.H. The Epidemiology of Antisocial Behavior in Early Adolescents, Aged 12 to 14. M.D. Levine and E.R. McAnarney (eds.). *Early Adolescent Transitions*, Heath, Lexington, Mass., pp. 245-259, 1988.

Woodward, C.A., Boyle, M.H., Offord, D.R. and Cadman, D.T., Links, P.S., Munroe Blum, H., Byrne, C. and Thomas, H. Ontario Child Health Study: Patterns of Ambulatory Medical Care Utilization and Their Correlates. *Pediatrics*, 82(3):425-434, 1988.

Published: 1989

Links, P.S., Boyle, M.H. and Offord, D.R. The Prevalence of Emotional Disorder in Children. *The Journal of Nervous and Mental Disease*, 177:85-91, 1989.

Rae-Grant, N.I., Thomas, B.H., Offord, D.R. and Boyle, M.H. Risk, Protective Factors and the Prevalence of Behavioral and Emotional Disorders in Children and Adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28(2):262-268, 1989.

Szatmari, P., Offord, D.R. and Boyle, M.H. Correlates, Associated Impairments and Patterns of Service Utilization of Children with Attention Deficit Disorder: Findings of the Ontario Child Health Study. *Journal of Child Psychology and Psychiatry*, 30:205-218, 1989.

Szatmari, P., Offord, D.R. and Boyle, M.H. Ontario Child Health Study: Prevalence of Attention Deficit Disorders with Hyper-activity. *Journal of Child Psychology and Psychiatry*, 30:219-230, 1989.

In Press

Fleming, J.E., Offord, D.R. and Boyle, M.H. Ontario Child Health Study: Prevalence of Childhood and Adolescent Depression in the Community. *British Journal of Psychiatry*.

Munroe Blum, H., Boyle, M.H., Offord, D.R. and Kates, N. Immigrant Children - Psychiatric Disorder, School Performance and Service Utilization. *American Journal of Orthopsychiatry*.

Offord, D.R. and Boyle, M.H. Ontario Child Health Study: Correlates of Disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*.

Offord, D.R., Boyle, M.H., Fleming, J.E., Munroe Blum, H. and Rae-Grant, N.I. Ontario Child Health Study: Summary of Selected Results. *Canadian Journal of Psychiatry*.

Offord, D.R., Boyle, M.H. and Racine, Y.A. Children at Risk. Ministry of Community and Social Services, Toronto, Ontario. Offord, D.R., Boyle, M.H., and Racine, Y.A. The Epidemiology of Antisocial Behavior in Childhood and Adolescence: Findings from the Ontario Child Health Study. In Pepler, D. and Rubin, K.H. (eds.), *The Development and Treatment of Childhood Aggression*, Lawrence Erlbaum, New York.

Rae-Grant, N.I., Offord, D.R. and Munroe Blum H. Ontario Child Health Study: Implications for Clinical Services, Research and Training. *Canadian Journal of Psychiatry*.

Woodward, C.A., Thomas, B.H., Boyle, M.H., and Offord, D.R. Methodologic Note for Child Epidemiological Surveys: The Effects of Instructions on Estimates of Behavior Prevalence. *Journal of Child Psychology and Psychiatry*.

Papers Submitted to Refereed Journals

Boyle, M.H., Offord, D.R. and Skinner, H. Validating Measures of Psychiatric Disorder: Problems and Prospects.

Boyle, M.H. and Offord, D.R. Psychiatric Disorder and Substance Use in Adolescence.

Cadman, D., Boyle, M.H. and Offord, D.R. Children with Chronic Illness: Family Characteristics and Correlates of Psychiatric Disorder.

Theses

Alder, R. A Study of the Etiology of Conduct Disorder in Ontario Children. Thesis for Master of Medical Science, McMaster University, 1984.

Boyle, M.H. Validation of Survey Instruments Used in the Ontario Child Health Study (OCHS) to Measure Psychiatric Disorder Among Children Aged 4-16. Ph.D. Thesis, Graduate Department of Community Health, University of Toronto, 1988.

Freeburn, Erin C. A Multitrait-Multimethod Analysis of Three Scales of the Achenbach Child Behavior Checklist, Masters Thesis, Department of Psychology, Faculty of Graduate Studies, University of Guelph, 1985.

Hobbs, Charlotte. A Comparison of the Prevalence and Course of Emotional and Behavioural Problems in Children with Speech Problems Compared to Children with other Chronic Illnesses. Ph.D. Thesis, Department of Epidemiology, McGill University. In preparation, 1987.

Szatmari, P. Issues in Assessing the Taxonomic Validity of Child Psychiatric Diagnosis: Findings of the Ontario Child Health Study. M.Sc. Thesis, Design Measurement and Evaluation Program, Department of Clinical Epidemiology and Biostatistics, McMaster University, 1986.

Thomas, Helen. The Influence of Protective Factors on the Presence of Conduct Disorder in a High Risk Group of 12 to 16 Year Old Boys. Masters Thesis, Department of Health Studies, University of Waterloo, 1986.

Submitted to Ministry of Community and Social Services

Boyle, M.H. Choosing Instruments to Assess Emotional and Behavioural Disorders of Childhood for Use in Primary Prevention Studies, 1989.

Byles, J.A., Byrne, C., Offord, D.R. and Boyle, M.H. Ontario Child Health Study: Family Functioning and Emotional/Behavioral Disorders in Children, 1986.

Links, P.S., Boyle, M.H., Munroe Blum, H. and Offord, D.R. The Social Support of Children in the Community: Part 1, 1986.

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Offord, D.R., Boyle, M.H., Szatmari, P., Rae-Grant, N.I., Links, P.S., Cadman, D.T., Byles, J.A., Crawford, J.W., Munroe Blum, H., Byrne, C., Thomas, H. and Woodward, C.A. Ontario Child Health Study: Correlates of Disorder, 1985.

Woodward, C.A., Boyle, M.H., Offord, D.R., Links, P.S., Cadman, D.T., Byles, J.A., Rae-Grant, N.I., Szatmari, P., Crawford, J.W., Munroe Blum, H., Byrne, C. and Thomas, H. Ontario Child Health Study: Correlates of Utilization, 1985.

Other Documents Submitted to Ministry of Community and Social Services

Byles, J.A., Boyle, M.H., Offord, D.R. and Links, P.S. Maternity Homes Post-Natal Support Program: Report on Community Programs for Young Mothers, 1985.

Hagens, S., Thomas, H. and Byles, J.A. A Review and Assessment of Protocols for Interagency Collaboration in Reporting, Investigating and Managing Child Abuse in Ontario, 1986.

McNamee, J.E. and Offord, D.R. The Effects of Diet on Children's Mood and Behaviour: A Critical Review of the Literature, 1986.